Human Biology

- Introduction: Definition of BIOLOGY
- Scientific method: 1. observation
  - 2. hypothesis
  - 3. experimentation
  - 4. conclusion
- Terms: variables, controls, theory, law, data, repeatable
- Assumptions: natural cause & effect
  - uniformity in space & time
  - common perception

**Theory—Conceptual Scheme**

- It shows orderly relationship of diverse & isolated observations
- It can predict future events (indirectly confirms it)
- It is modifiable as new data comes
- It can develop new directions for research
- This is true of a GOOD Theory
The Characteristics of Life

Life is diverse yet all living things share common characteristics.
- Living things are organized.
Living things respond to stimuli.

Living things may respond to external stimuli by movement toward or away from a stimulus.

Movement constitutes part of the behavior of an organism.

Living things reproduce.

Genes (DNA) contain information needed for heredity and metabolism.

Metabolism is all the chemical reactions in the cell.

Reproduction may be asexual or sexual.

Living things are homeostatic.

Homeostasis is the ability of an organism to maintain relatively constant internal conditions.

An example is temperature regulation in the human body.

All organ systems contribute to homeostasis.
Living things grow and develop.

The Organization of the Biosphere

The biosphere is the zone of life in the air, water, and land that surrounds the planet. Groups of individuals of a species are called populations. Populations of different species that interact make up communities. Communities plus the physical habitat form ecosystems.
Cells

- The basic unit of life
- Leeuwenhoek-(1600's) many scopes
- Hooke-confirmed and named them (1662)
- Schleiden & Schwann-Cell Theory (1839)
  All living matter made up of cells
- (Virchow Added)-& all Cells come from preexisting cells

= Basic Theory of Biology

Cell = Nucleus (control) & Cytoplasm (place for manufacturing) & Cell Membrane (control traffic in & out)

ORGANIZATION of LIFE

- Cell—smallest unit of life
- Tissue-similar cells that perform a specific function
- Organ-several tissue types that together form a specific function

Organ System- 2 or more organs working together

Multicellular Organisms-complete living organism of many cells
Organelles of cells

Nucleus—Control center (heredity & activities)
Nuclear envelope—controls traffic in & out
Chromatin—DNA + protein with genetic info.
Nucleolus—DNA & proteins to synthesize ribosome
Ribosomes (protein + rRNA) — place to make protein
Endoplasmic Reticulum—membranous channels
Rough ER—protein synthesis
Smooth ER—lipid synthesis & detoxification
Golgi Apparatus—modify & package proteins
Lysosome—membranous vesicles with digestive enzymes
Vacuoles, Vesicles, Peroxisomes (break fat H₂O₂)
Other Organelles

Chloroplasts—in plants to make sugar

Mitochondria—in both for making usable energy (ATP) by burning sugar (cellular respiration) = “Powerhouse” Have double membrane

Cytoskeleton—give shape and allow movement: actin filaments, intermediate filaments, microtubules

Centrioles, cilia, flagella
Prokaryotic Vs. Eukaryotic (‘true’)  
**ie. Bacteria and archaea**

- Smaller (1-10 micrometers)
- No true nucleus (with N.M.); have circular DNA in nucleoid (+plasmids)
- No organelles except ribosomes but very metabolically complex
- Cell wall (just outside C.M.) has unique peptidoglycan molecules
- Its flagella rotates like propeller
Cell Membrane—Islands of protein floating in a sea of lipids

- Protein Function: channel, carrier, recognition, receptor, enzymatic
- Differentially Permeable
- Transport: Facilitated
  - Active (Na-K pump): 40%
  - Exocytosis: Get secretions OUT
  - Endocytosis: phagocytosis
    - pinocytosis
    - receptor-mediated
Diffusion & Osmosis

- Diffusion (physical) from higher concentration to lower
- Osmosis—movement of water over a selectively permeable membrane
  - Isotonic
  - Hypotonic—cell swells
  - Hypertonic—cell shrinks

- http://www.cellsalive.com/cell_cycle.htm